

Axial Flux Motor for a Novel Immersed Mechatronic Pump Architecture for Highly Integrated Thermal-Management

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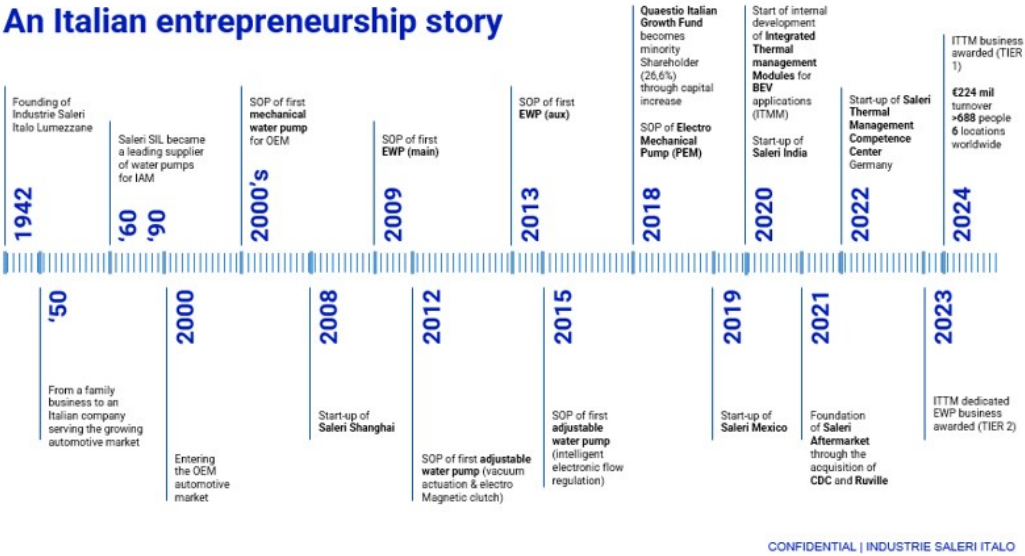
R&D Technical leader

Saleri



Company Intro

An Italian entrepreneurship story



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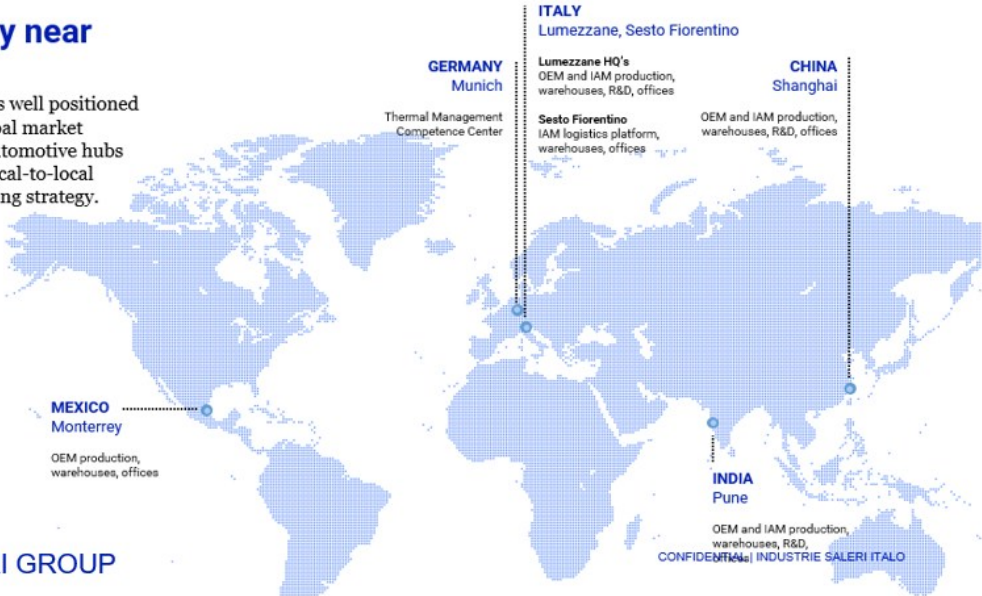
Product Coverage

	ICE	HYBRID (PHEV, MHEV, HEV)	ELECTRIC
Integrated Thermal Management Modules (ITMM)		●	●
Electrical Water Pumps (12V-24V-48V)	●	●	●
Electro-mechanical Water Pumps	●	●	
Switchable Water Pumps	●	●	
Mechanical Water Pumps	●	●	
Multi Ports Valves	●	●	●

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Globally near

The Group is well positioned to serve global market and main automotive hubs through a local-to-local manufacturing strategy.



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Highly automated, modular & flexible production

The Group has implemented a **highly automated** production system based on principles of modularity and flexibility. This allows to produce with the highest levels of **quality** and **reliability**, handling a large number of variations and volume growth. The production structure at the plants can be adapted to the small and large production.

The use of advanced technology together with the development of specific know-how allows the implementation of state-of-the-art solutions and enables the **optimisation of the manufacturing process** while, also, guaranteeing the best use of resources.



Global excellence, Saleri quality

Saleri Group has constantly pursued continuous progress to anticipate the growing demands and strict standards of the automotive market.

Through in-house testing facilities, Saleri assesses and guarantees life-long product quality:

- Performance / Characterization Testing
- Durability tests
- Environmental Tests (climatic chambers, thermal shocks, salt spray, corrosion, immersion)
- Vibration Testing (Shaker with climate chamber)
- NVH Testing
- Accelerated Aging Tests

R&D – Innovation is our core business

Saleri drives Advanced Thermal Solutions through a dedicated department. The new market scenarios require to further characterize the company towards its customers as a **partner and technological reference**. To catch and even influence future market trends (electrification, sustainability, ecological transition, IoT), to proactively elaborate technological and scientific development paths, and ultimately, enhance each car maker's technological uniqueness.

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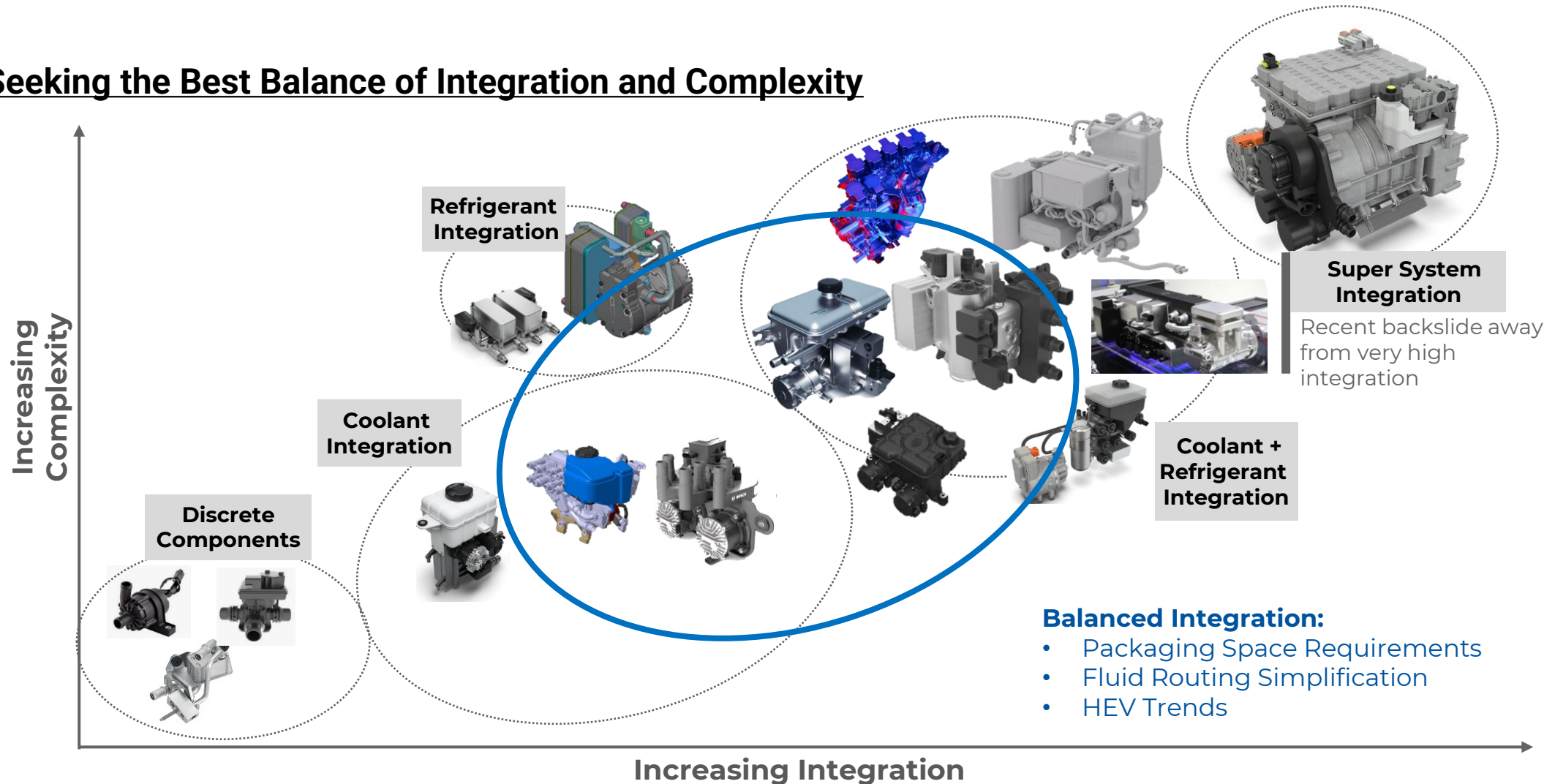
R&D – Innovation is our core business

Saleri operates a **Thermal Management Competence Center in Munich, Germany**, focused on supporting customers in developing integrated thermal management systems for next generation Battery Electric Vehicle (BEV) platforms. We also have established R&D centers in Shanghai, China, and Pune, India, expanding our global reach and fostering innovation on a worldwide scale.

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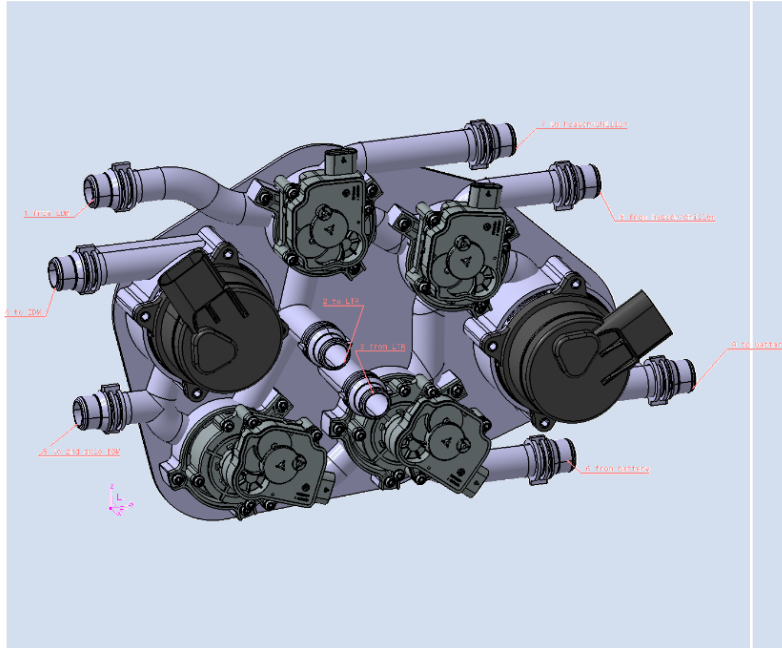
System Complexity Increases Need for Integration

Seeking the Best Balance of Integration and Complexity



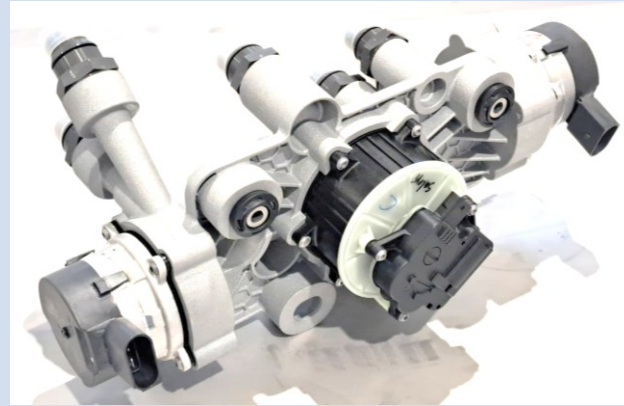
System layout - Multiway Valve & Compact axial flux E-motor Pumps

Initial design

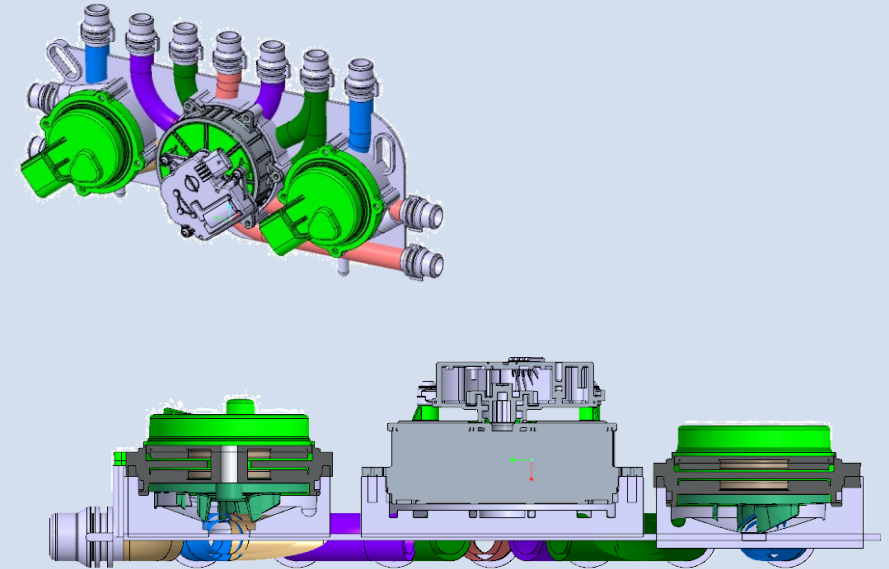


- 1) **Radial Flux Pumps**
- 2) Switch-Valves
- 3) 3Way - Proportional Valve
- 4) Plastic Frame
- 5) Support hinges

Integrated



Integrated & Compact



- 1) **Axial Flux Pumps**
- 2) Multi-Way (*Proportional) Valve
- 3) Plastic Frame
- 4) Support hinges

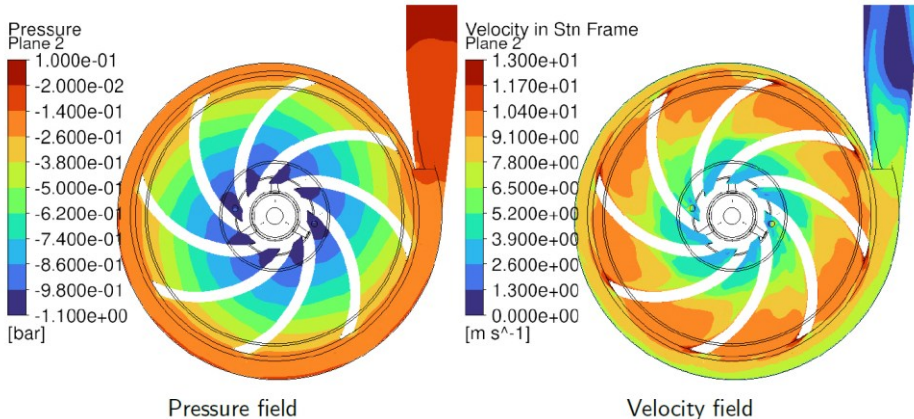
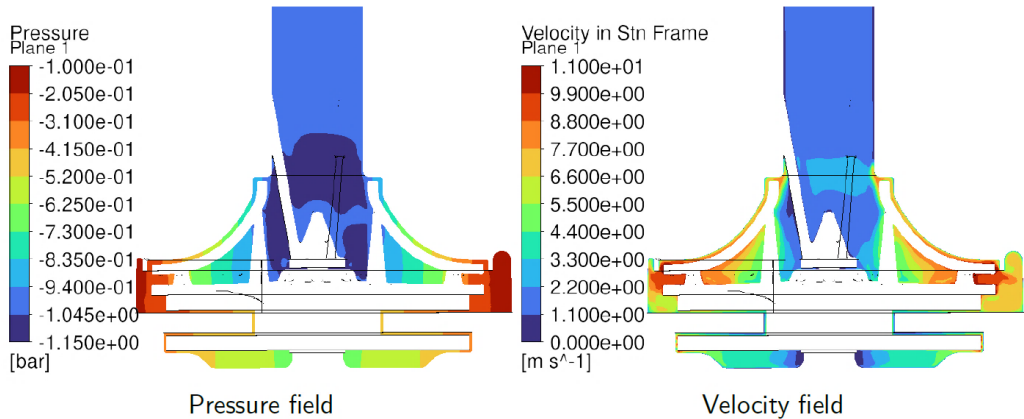
Targets

- Minimal space and maximum functionality
- Reduced design, assembly complexity and n.o. of components
- Realize optimal cooling
- Compact and scalable design = standardization

Electric Coolant Pump with Axial Flux eMotor – Proposed Solution

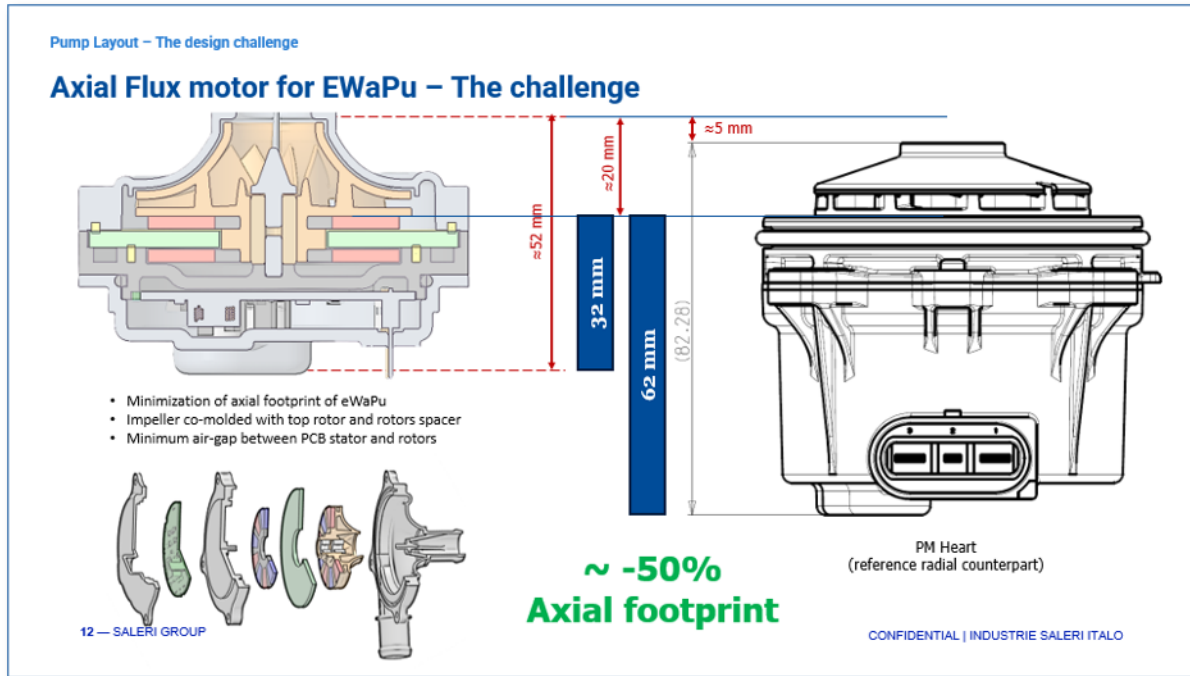
Parameter	eMot. Eff.	Hyd. Eff.	Drag Loss.
Rotational Speed (rpm)	+	+	++
Rotor vs Impeller D (mm)	none	n.a.	+
Rotor Flatness	n.a.	none	--
Rotor Thickness (mm)	+	none	+
Recirculation Gaps (mm)	n.a.	-	+

Table summarizing the impact on the investigated pump design parameters on eMotor and Hydraulic efficiencies:



- Hydraulic efficiency comparable to reference pump w. radial motor
- Optimal package to contain electric pump axial footprint
- Balanced pressure field inside the volute

Compact axial flux E-motor Pumps



Integrated & Compact Axial Flux Pump for TMM



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